Claims

What is claimed is:

1. A loudspeaker system having a line array of drivers comprising:

a first pair of drivers;

a center point along the line array, wherein the pair of drivers are substantially centered about the center point with a center to center distance of d_0 between the first pair of drivers; and

at least a subsequent pair of drivers arranged in the line array with the first pair of drivers and substantially centered about the center point, wherein the subsequent pair of drivers are spaced such that the center to center distance between each at least a subsequent pair of drivers, d_n, is equal to $4nd_0$, where $n = 0$ at the innermost pair of drivers and n increases by 1 for each at least a subsequent pair of drivers.

2. The loudspeaker system of claim 1, further comprising a low pass filter on every pair of drivers for $n > 0$.

3. The loudspeaker system of claim 2, wherein the low pass filter has a different frequency for each pair of drivers.

4. The loudspeaker system of claim 2, wherein each low pass filter is of first order.

5. The loudspeaker system of claim 3, wherein the frequency, f_n, of the low pass filter is equal to $2c/d_n$, where c is the speed of sound.

6. The loudspeaker system of claim 5, wherein the low pass filter on the outermost pair of drivers in the array has a lower frequency than calculated by $f_n = 2c/d_n$ for the outermost pair of drivers.

7. The loudspeaker system of claim 1, further comprising a driver centered on the center point of the line array.

8. A transducer spacing arrangement in an array, the arrangement comprising:

a first pair of transducers having a first distance, d_0, between the center points of the transducers in the first pair of transducers;

a second pair of transducers arranged in the array with the first pair of transducers and having a second distance, d_1, between the center points of the transducers in the second pair of transducers, wherein the midpoint of d_0 is the same midpoint of d_1, and wherein the second distance, d_1, is equal to $4d_0$; and

a low pass filter of first order on the second pair of transducers.

9. The transducer spacing arrangement of claim 8, further comprising an at least a third pair of transducers arranged in the array with the first pair of transducers and having a distance, d_n, between the center points of the transducers in the at least a third pair of transducers, wherein the midpoint of d_0 is the same midpoint of d_n; and wherein the distance, d_n, is equal to $4nd_0$ where $n = 0$ at the innermost pair of transducers and n increases by 1 for each pair of transducers, whereby $n = 0$ for the first pair of transducers, $n = 1$ for the second pair of transducers, and $n = 2$ for the third pair of transducers.

10. The transducer spacing arrangement of claim 9, wherein d_0 is 1.2 inches, d_1 is 4.8 inches, and d_2 is 9.6 inches.

11. The transducer spacing arrangement of claim 8, further comprising a transducer at the center point of d_0.

12. The transducer spacing arrangement of claim 9, further comprising a low pass filter of first order on the at least a third pair of transducers.

13. The transducer spacing arrangement of claim 12, wherein the outermost pair of transducers in the array has the lowest frequency low pass filter.

14. A method for optimizing a radiation pattern of drivers in a line on a loudspeaker, the method comprising the steps of:

selecting a spacing, d_0, between the centers of a pair of innermost drivers according to the formula

$$d_0 = c/2f$$

wherein c is the speed of sound and f is the maximum desired operational frequency;

selecting a center point in the line, wherein the center point is the same position on the line as $d_0/2$; and

determining the spacing of at least one additional pairs of drivers in the line wherein each driver of the additional pair of drivers is added to the outermost positions of the line, wherein the distance, d_n, between the centers of the additional drivers is according to the formula

$$d_n = 4nd_0$$

where $n = 0$ at the innermost pair of drivers and n increases by 1 with each pair of drivers sequentially added along the array.

15. The method of claim 14, wherein the pairs of drivers are used in conjunction with low pass filtering.

16. The method of claim 15, wherein the low pass filtering is of the first order.

17. The method of claim 15, wherein the frequency, f_n, of the low pass filters for each pair of drivers is calculated according to the equation $f_n = 2c/d_n$.

18. The method of claim 17, wherein the low pass filter for the outermost pair of drivers has a lower frequency than calculated by the equation of $f_n = 2c/d_n$.

19. The method of claim 14, wherein the maximum desired operational frequency is substantially the highest frequency without high amplitude side lobes.